IS 8475 (1977): Lead based antifriction bearing alloy for heavy duty applications [MTD 9: Lead, Zinc, Cadmium, Tin, Antimony and their Alloys]

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(Reaffirmed 2003)

Indian Standard

SPECIFICATION FOR LEAD-BASE ANTIFRICTION BEARING ALLOY FOR HEAVY DUTY APPLICATIONS

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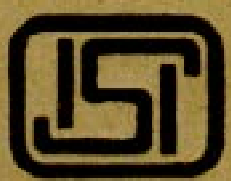

INDIAN STANDARDS INSTITUTION
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Indian Standard

SPECIFICATION FOR LEAD-BASE ANTIFRICTION BEARING ALLOY FOR HEAVY DUTY APPLICATIONS

0. FOREWORD

0.1 This Indian Standard was adopted by the Indian Standards Institution on 31 May 1977, after the draft finalized by the Lead, Zinc, Tin, Antimony and Their Alloys Sectional Committee had been approved by the Structural and Metals Division Council.

0.2 Lead-base antifriction alloy, specified in this standard, has been found suitable for heavy duty applications. For this purpose, hardness values at different temperatures have been specified. For hardening, it is recognized that elements such as cadmium, nickel, silver, tellurium or arsenic are sometimes added to such alloys, but while for particular applications improved properties are claimed, some of the resulting alloys are more difficult to use and, therefore, guidance should always be sought from the producer.

0.3 For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test or analysis, shall be rounded off in accordance with IS : 2-1960*. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

1. SCOPE

1.1 This standard covers the requirements for lead-base antifriction bearing alloy for heavy duty applications involving severe requirements with regard to sliding properties and loading.

2. SUPPLY OF MATERIAL

2.1 General requirements relating to the supply of the material shall be as laid down in IS : 1387-1967†.

*Rules for rounding off numerical values (*revised*).

†General requirements for the supply of metallurgical materials (*first revision*).

3. CHEMICAL COMPOSITION

3.1 The chemical composition of the material when analysed in accordance with IS : 1409-1959* shall be as follows:

Constituent	*Percent*
Tin	5 to 7
Antimony	14 to 16
Copper	0·8 to 1·2
Cadmium	0·8 to 1·5
Arsenic	0·5 to 0·8
Nickel	0·8 to 1·5
Lead	Remainder
Impurities	
Iron	0·1 *Max*
Zinc	0·05 *Max*
Aluminium	0·05 *Max*
Iron+Zinc+Aluminium	0·15 *Max*

4. HARDNESS TEST AFTER REMELTING

4.1 The sample of the material shall be melted and cast fully into two 50-ml round bars in the chill mould as shown in Fig. 1. The melting should be carried out in a crucible or a pot covered with charcoal to avoid oxidation. The pouring temperature shall be between 480 and 520°C and the bath temperature shall not exceed 550°C. The hardness test shall be carried out on the transverse interfaces of the test pieces cut at a distance of 37 $\pm$ 5 mm from the bottom of the cast test bars. The Brinell hardness when tested with a load of 500 kg for 30 seconds on the test pieces shall conform to the requirements stipulated in Table 1. Average of three readings shall be taken for each temperature.

TABLE 1 BRINELL HARDNESS NUMBERS

TEMPERATURE, °C	BRINELL HARDNESS, HB, *Min*
20	24
50	21
100	16

*Methods of chemical analysis of antifriction bearing alloys.

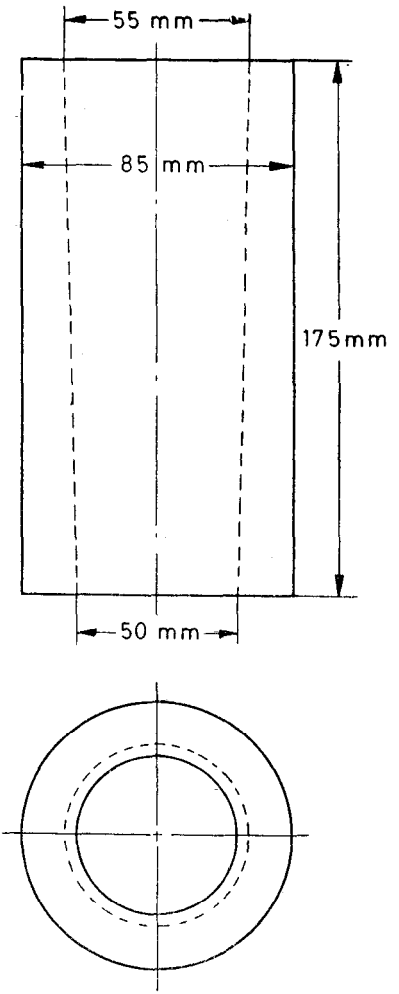

FIG. 1 MOULD FOR CASTING HARDNESS TEST PIECE

5. FREEDOM FROM DEFECTS

5.1 The ingot shall be homogeneous and free from non-metallic inclusions and have a clean appearance.

6. WEIGHT OF INGOT

6.1 The weight of each ingot shall not exceed 15 kg.

7. FRACTURE TEST

7.1 Unless otherwise agreed to between the purchaser and the manufacturer, two percent of the ingots from each melt shall be broken at the notch to ascertain the nature of the fracture. The fractured surfaces shall not show segregation, dross, dirt spots, over-heated metal or any type of non-metallic inclusions.

8. SAMPLING

8.1 Sampling for Chemical Analysis — Unless otherwise agreed to between the purchaser and the manufacturer, 2 ingots or 2 percent of the ingots whichever is greater up to a maximum of 5 ingots, shall be selected at random from each melt.

8.1.1 The method of preparing samples for chemical analysis from the ingots selected as laid down in **8.1** shall be in accordance with IS : 1817-1961*.

8.2 Sampling for Fracture Test — Unless otherwise agreed to between the purchaser and the manufacturer, sampling shall be done as given in **7.1.**

8.3 Sampling for Hardness Test — Unless otherwise agreed to between the purchaser and manufacturer, one ingot shall be selected per heat for the purpose of testing hardness.

9. RETEST

9.1 Retest for Chemical Composition — If the sample prepared under **8.1.1** fails to meet the requirements specified in **3.1**, two more tests shall be conducted on the same sample. If both the test results conform to the requirements laid down in **3.1**, the lot shall be accepted. Should either of the retests fail, the lot represented shall be deemed as not complying with this standard.

9.2 Retest for Hardness and Fracture Test — If the samples selected for the test fail to meet the requirements stipulated in **4** or **7.1**, two further samples shall be taken from the same melt for each requirement. If both the samples pass in each case, the lot should be accepted.

*Methods of sampling non-ferrous metals for chemical analysis.

10. MARKING

10.1 Each ingot shall be legibly marked with the following:

a) Cast number,

b) Manufacturer's name, initials or recognized trade-mark, and

c) Any other details as specified by the purchaser.

10.1.1 The ingot may also be marked with the ISI Certification Mark.

NOTE — The use of the ISI Certification Mark is governed by the provisions of the Indian Standards Institution (Certification Marks) Act and the Rules and Regulations made thereunder. The ISI Mark on products covered by an Indian Standard conveys the assurance that they have been produced to comply with the requirements of that standard under a well-defined system of inspection, testing and quality control which is devised and supervised by ISI and operated by the producer. ISI marked products are also continuously checked by ISI for conformity to that standard as a further safeguard. Details of conditions under which a licence for the use of the ISI Certification Mark may be granted to manufacturers or processors, may be obtained from the Indian Standards Institution.

INTERNATIONAL SYSTEM OF UNITS (SI UNITS)

Base Units

Quantity	*Unit*	*Symbol*
Length	metre	m
Mass	kilogram	kg
Time	second	s
Electric current	ampere	A
Thermodynamic temperature	kelvin	K
Luminous intensity	candela	cd
Amount of substance	mole	mol

Supplementary Units

Quantity	*Unit*	*Symbol*
Plane angle	radian	rad
Solid angle	steradian	sr

Derived Units

Quantity	*Unit*	*Symbol*	*Conversion*
Force	newton	N	1 N = 1 kg.1 m/s^2
Energy	joule	J	1 J = 1 N.m
Power	watt	W	1 W = 1 J/s
Flux	weber	Wb	1 Wb = 1 V.s
Flux density	tesla	T	1 T = 1 Wb/m^2
Frequency	hertz	Hz	1 Hz = 1 c/s (s^{-1})
Electric conductance	siemens	S	1 S = 1 A/V
Pressure, stress	pascal	Pa	1 Pa = 1 N/m^2